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10/737,123	12/16/2003	Wei Fan	YOR920030457US1	5953

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EXAMINER	
LE, MIRANDA	
ART UNIT	**PAPER NUMBER**
2167	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/737,123	FAN ET AL.	
	Examiner	Art Unit	
	Miranda Le	2167	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAIL ACTION

1. This communication is responsive to Amendment, filed 10/12/06.

2. Claims 1-35 are pending in this application. This action is made Final.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkayala et al. (US Pub. No. 20030212679), in view of Rosen et al. (US Pat. No. 6,513,025).

As to claims 1, 28, 35, Venkayala teaches a method of searching data in databases using an ensemble of models (i.e. seeds models, [0018]), said method comprising:

ordering models (i.e. scoring of models, [0017]) within said ensemble in order of prediction accuracy (i.e. Trained model 110 may also be evaluated and adjusted in order to improve the quality, i.e. prediction accuracy, of the model, [0019]), with the most accurate model being first in said order (i.e. a topmost category including a class value having a highest associated probability, [0010]) ([0008-0009, 0018, 0019, 0035]);

selecting a sub-ensemble of said models that meets a given level of confidence (i.e. how much confidence may be placed in the prediction, [0023], the selected class values are those meeting the selection criteria presented in prediction parameters, [0024]), wherein said sub-ensemble in said order prediction accuracy ([0010, 0035]); and

applying said sub-ensemble, in place of said ensemble, to an example to make a prediction (i.e. The selected class values, which are included in multi-category apply output, [0024]) ([0010, 0035]).

Venkayala teaches the step of forming sub-ensembles, wherein said sub-ensembles in said order of prediction accuracy (i.e. model apply, [0017]). But Venkayala does not expressly teach "models are joined together in said sub-ensemble".

Rosen teaches "models are joined together in said sub-ensemble" (i.e. The most dependable classification model, that is the classification model associated with the dependability model indicating the highest dependability for the unlabeled example, is chosen to classify each unclassified example (col. 4, line 66 to col. 5, line 9).

It would have been obvious to one of ordinary skill of the art having the teaching of Venkayala and Rosen at the time the invention was made to modify the system of Venkayala to include wherein models are joined together in said sub-ensemble in said order of prediction accuracy as taught by Rosen.

One of ordinary skill in the art would be motivated to make this combination in order to select the most appropriate classification model, and the prediction of that classification model is then accepted in view of Rosen, as doing so would give the added benefit of coalescing the predictions of the base models by learning the relationships between those predictions and the correct prediction, identifying a specific classification model as the one responsible for producing a final prediction and to including a simple explanation of why the prediction was made, and revising the selected model as the models change over time as taught by Rosen (col. 2, lines 31-42).

As per claim 8, Venkayala teaches a method of searching data in databases using an ensemble of models (i.e. seeds models, [0018]), said method comprising:

ordering models (i.e. scoring of models, [0017]) within said ensemble in order of prediction accuracy (i.e. Trained model 110 may also be evaluated and adjusted in order to improve the quality, i.e. prediction accuracy, of the model, [0019]), with the most accurate model being first in said order (i.e. a topmost category including a class value having a highest associated probability, [0010]) ([0008-0009, 0018, 0019, 0035]);

selecting a sub-ensemble of said models that meets a given level of confidence (i.e. how much confidence may be placed in the prediction, [0023], the selected class values are those

meeting the selection criteria presented in prediction parameters, [0024]), wherein said sub-ensemble in said order prediction accuracy, such that said sub-ensemble include only the most accurate models (i.e. a topmost category including a class value having a highest associated probability, [0010]) ([0008, 0009, 0035]); and

applying said sub-ensemble, in place of said ensemble, to an example to make a prediction (i.e. The selected class values, which are included in multi-category apply output, [0024]) ([0010, 0035]).

Venkayala teaches the step of forming sub-ensembles, wherein said sub-ensembles in said order of prediction accuracy (i.e. model apply, [0017]). Venkayala does not expressly teach "models are joined together in said sub-ensemble".

However, Rosen teaches "models are joined together in said sub-ensemble" (i.e. The most dependable classification model, that is the classification model associated with the dependability model indicating the highest dependability for the unlabeled example, is chosen to classify each unclassified example (col. 4, line 66 to col. 5, line 9).

It would have been obvious to one of ordinary skill of the art having the teaching of Venkayala and Rosen at the time the invention was made to modify the system of Venkayala to include wherein models are joined together in said sub-ensemble in said order of prediction accuracy as taught by Rosen.

One of ordinary skill in the art would be motivated to make this combination in order to select the most appropriate classification model, and the prediction of that classification model is then accepted in view of Rosen, as doing so would give the added benefit of coalescing the predictions of the base models by learning the relationships between those predictions and the

correct prediction, identifying a specific classification model as the one responsible for producing a final prediction and to including a simple explanation of why the prediction was made, and revising the selected model as the models change over time as taught by Rosen (col. 2, lines 31-42).

As per claim 15, Venkayala teaches a method of searching data in databases using an ensemble of models (i.e. seeds models, [0018]), said method comprising:

performing training (i.e. training/model building, [0019]) comprising:

ordering models (i.e. scoring of models, [0017]) within said ensemble in order of prediction accuracy (i.e. Trained model 110 may also be evaluated and adjusted in order to improve the quality, i.e. prediction accuracy, of the model, [0019]), with the most accurate model being first in said order (i.e. a topmost category including a class value having a highest associated probability, [0010]) ([0008-0009, 0018, 0019, 0035]);

forming sub-ensembles (i.e. model apply, [0017]), wherein said sub-ensemble in said order of prediction accuracy ([0010, 0035]);

calculating confidence values of each of said sub-ensembles (i.e. to generate one or more scores for each row of data in scoring data. The scores for each row of data indicate how closely the row of data matches attributes of the model, how much confidence may be placed in the prediction, [0023]); and making a prediction comprising:

selecting a sub-ensemble of said models that meets a given level of confidence (i.e. The selected class values are those meeting the selection criteria presented in prediction parameters, [0024]) ([0010, 0035]); and

applying said sub-ensemble, in place of said ensemble, to an example to make a prediction (i.e. The selected class values, which are included in multi-category apply output, [0024]) ([0010, 0035]).

Although Venkayala teaches the step of forming sub-ensembles, wherein said sub-ensembles in said order of prediction accuracy (i.e. model apply, [0017]), Venkayala does not expressly teach "joining different number of models together to form sub-ensembles".

Rosen teaches "joining different number of models together to form sub-ensembles" (i.e. The most dependable classification model, that is the classification model associated with the dependability model indicating the highest dependability for the unlabeled example, is chosen to classify each unclassified example (col. 4, line 66 to col. 5, line 9).

It would have been obvious to one of ordinary skill of the art having the teaching of Venkayala and Rosen at the time the invention was made to modify the system of Venkayala to include joining different numbers of models together to form sub-ensembles, wherein models are joined together in said sub-ensemble in said order of prediction accuracy as taught by Rosen.

One of ordinary skill in the art would be motivated to make this combination in order to select the most appropriate classification model, and the prediction of that classification model is then accepted in view of Rosen, as doing so would give the added benefit of coalescing the predictions of the base models by learning the relationships between those predictions and the correct prediction, identifying a specific classification model as the one responsible for producing a final prediction and to including a simple explanation of why the prediction was made, and revising the selected model as the models change over time as taught by Rosen (col. 2, lines 31-42).

As per claim 21, Venkayala teaches a service of searching data in databases using an ensemble of models (i.e. seeds models, [0018]), said service comprising:

ordering models (i.e. scoring of models, [0017]) within said ensemble in order of prediction accuracy (i.e. Trained model 110 may also be evaluated and adjusted in order to improve the quality, i.e. prediction accuracy, of the model, [0019]), with the most accurate model being first in said order (i.e. a topmost category including a class value having a highest associated probability, [0010]) ([0008-0009, 0018, 0019, 0035]);

selecting a sub-ensemble of said models that meets a given level of confidence (i.e. how much confidence may be placed in the prediction, [0023], the selected class values are those meeting the selection criteria presented in prediction parameters, [0024]), wherein said sub-ensemble in said order prediction accuracy ([0010, 0035]); and

applying said sub-ensemble, in place of said ensemble, to an example to make a prediction (i.e. The selected class values, which are included in multi-category apply output, [0024]) ([0010, 0035]).

Venkayala teaches the step of forming sub-ensembles, wherein said sub-ensembles in said order of prediction accuracy (i.e. model apply, [0017]). But Venkayala does not expressly teach "models are joined together in said sub-ensemble".

However, Rosen teaches "models are joined together in said sub-ensemble" (i.e. The most dependable classification model, that is the classification model associated with the dependability model indicating the highest dependability for the unlabeled example, is chosen to classify each unclassified example (col. 4, line 66 to col. 5, line 9).

It would have been obvious to one of ordinary skill of the art having the teaching of Venkayala and Rosen at the time the invention was made to modify the system of Venkayala to include wherein models are joined together in said sub-ensemble in said order of prediction accuracy as taught by Rosen.

One of ordinary skill in the art would be motivated to make this combination in order to select the most appropriate classification model, and the prediction of that classification model is then accepted in view of Rosen, as doing so would give the added benefit of coalescing the predictions of the base models by learning the relationships between those predictions and the correct prediction, identifying a specific classification model as the one responsible for producing a final prediction and to including a simple explanation of why the prediction was made, and revising the selected model as the models change over time as taught by Rosen (col. 2, lines 31-42).

As to claims 2, 9, 16, 22, 29, Venkayala teaches said sub-ensemble includes fewer models than said ensemble (i.e. The selection criterion may comprise one of a topmost category including a class value having a highest associated probability, top N categories including N class values having highest associated probabilities, bottom N categories including N class values having lowest associated probabilities, or a set of select class values specified by the user and their associated probabilities and ranks, [0010]).

As to claims 3, 10, 17, 23, 30, Venkayala teaches said confidence is a measure of how closely results from said sub-ensemble will match results from said ensemble (i.e. The scores for

each row of data indicate how closely the row of data matches attributes of the model, how much confidence may be placed in the prediction, how likely each output, [0049]).

As to claims 4, 11, 18, 24, 31, Venkayala teaches the size of each sub-ensemble is different and has a potentially different level of confidence (i.e. The selection criterion may comprise one of a topmost category including a class value having a highest associated probability, top N categories including N class values having highest associated probabilities, bottom N categories including N class values having lowest associated probabilities, or a set of select class values specified by the user and their associated probabilities and ranks, [0010]).

As to claims 5, 12, 19, 25, 32, Venkayala teaches the size of said ensemble is fixed (i.e. the selection criteria may include a limit on the number of class values that are to be selected, [0050]).

As to claims 6, 13, 20, 26, 33, Venkayala teaches as the level of confidence is raised, a sub-ensemble that has more models will be selected in said selecting process (i.e. The selection criteria may be defined by desired results data, [0024]), and as the level of confidence is lowered, a sub-ensemble that has fewer models will be selected in said selecting process (i.e. The selection criterion may comprise one of a topmost category including a class value having a highest associated probability, top N categories including N class values having highest associated probabilities, bottom N categories including N class values having lowest associated

probabilities, or a set of select class values specified by the user and their associated probabilities and ranks, [0010]).

As to claims 7, 14, 27, 34, Venkayala teaches before said selecting, calculating confidence values of different sub-ensembles (i.e. to generate one or more scores for each row of data in scoring data. The scores for each row of data indicate how closely the row of data matches attributes of the model, how much confidence may be placed in the prediction, how likely each output, [0049]).

Response to Arguments

5. Applicant's arguments filed 10/12/06 have been fully considered but they are not persuasive.

A. Applicant argues that the "class values" of Venkayala have nothing to do with a sub-ensemble of models. Moreover, the class values are not selected prior to the application of the models, wherein the selected class values are applied in place of the models.

The Examiner respectfully disagrees for the following reasons:

a) The Venkayala teaches "ensemble", and "sub-ensemble", "ordering" as follows:

According to Applicants' Specification, the term "ensemble" and "sub-ensemble" are disclosed as "First the invention performs training. This training ***orders models within the ensemble*** in order of prediction accuracy with ***the most accurate model being first***, and ***joined together in the sub-ensemble*** in order of prediction accuracy (Instant Specification, Page 1).

Analogously, Venkayala's teaches all such steps as "***generating multi-category*** apply output with a plurality of predicted class values and their associated probabilities based on the received input data and a selection criterion" ([0007]), and "The selection criterion may comprise one of ***a topmost category including a class value*** having a highest associated probability, top N categories including N class values having highest associated probabilities" ([0008]), wherein:

(a) ***multi-category*** of Venkayala equates to ***the ensemble;***

(b) **a *particular category* *in the multi-category*** of Venkayala equates to ***the model***;

(c) ***a topmost category*** of Venkayala equates to ***orders models;***

(d) ***a top most category*** of Venkayala equates to ***the most accurate model being first;***

(e) ***a topmost category including a class value*** of Venkayala equates to ***sub-ensemble.***

It is recognized that a class value itself is not a sub-ensemble as Applicants argue; rather, it is "***a topmost category including a class value***" that equivalent to Applicants' "***sub-ensemble***".

b) The Venkayala teaches "selection a sub-ensemble" as "The ***selection*** criterion may comprise one of ***a topmost category including a class value" (*See [0007]).**

Note that *a topmost category including a class value* of Venkayala equates to *sub-ensemble.*

c) The Venkayala teaches "applying said sub-ensemble, *in place of said ensemble,* to an example to make a prediction" as "*A score/prediction* is *a category associated with probability* as the result of applying to *a supervised model* a record whose target value is unknown. A single-target apply operation produces the target value (or category) whose probability is the highest among the all target values" ([0030]), wherein:

a category associated with probability of Venkayala equates to ***sub-ensemble.***

a supervised model a record whose target value is unknown of Venkayala equates to ***an example.***

A score/prediction of Venkayala equates to *make a prediction.*

As mentioned in (a), ***a topmost category including a class value (See (e)) is also a category associated with probability.***

B. Applicant argues that the "scoring of models" in Venkayala does not teach **ordering, ranking, or otherwise sorting models**. Instead, the scoring step applies a trained model to make predictions based on data.

The examiner respectfully disagree.

As aforementioned in (c), ***a topmost category ([0008])*** of Venkayala equates to ***orders models;***

C. Applicants argue that the generated output having multiple class values has **nothing to do with a sub-ensemble of models** that is used in place of the ensemble of models. Instead the output 122 having **multiple class values is produced after the application** of the model 110.

Venkayala teaches "***applying said sub-ensemble, in place of said ensemble, to an example to make a prediction***" as "*A score/prediction* is *a category associated with probability* as the result of applying to *a supervised model* a record whose target value is unknown. A single-target apply operation produces the target value (or category) whose probability is the highest among the all target values" ([0030]) wherein:

a category associated with probability of Venkayala equates to ***sub-ensemble.***

a supervised model a record whose target value is unknown of Venkayala equates to ***an example.***

A score/prediction of Venkayala equates to ***make a prediction.***

Also ***a topmost category including a class value*** (See (e)) corresponds to *a category associated with probability.*

D. Applicants argue that the independent claims 1, 8, 15, 21, 28, and 35 defines **"selecting a sub-ensemble"** (of the ensemble of models) and **"applying said sub-ensemble".**

Similarly, Venkayala does teach *selecting a sub-ensemble* as "The ***selection*** criterion may comprise one of ***a topmost category including a class value"*** (See [0007]).

Note that ***a topmost category including a class value*** of Venkayala equates to ***sub-ensemble.***

Further, Venkayala teach the step of applying to the model after the step of selecting ***a topmost category including a class value*** as "*A score/prediction* is *a category associated with probability* as the result of applying to *a supervised model* a record whose target value is unknown. A single-target apply operation produces the target value (or category) whose probability is the highest among the all target values" ([0030]), wherein:

a category associated with probability of Venkayala equates to ***sub-ensemble.***

a supervised model a record whose target value is unknown of Venkayala equates to ***an example.***

A score/prediction of Venkayala equates to ***make a prediction.***

And, ***a topmost category including a class value (See (e)) is also*** *a category associated with probability.*

Arguments as raised are moot since all claim limitations relevant to this issue have been addressed accordingly.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Miranda Le whose telephone number is (571) 272-4112. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Cottingham, can be reached on (571) 272-7079. The fax number to this Art Unit is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Miranda Le
December 28, 2006

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